REMARKS

By the present amendment, claims 8-9 and 14 -20 are pending in the application. Claims 8, 14, 16, 18, 19 and 20 are independent claims.

§103

(i). Claims 8, 16, 18 and 20 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Japan No. 05-263469 to Furumi in view of U.S. Patent No. 6,059,482 to Beauvoir.

(ii). Claims 14 and 19 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Japan No. 05-263469 to Furumi in view of U.S. Patent No. 4,905,436 to Matsuo et al.

(iii). Claims 14 and 19 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Japan No. 05-263469 to Furumi in view of U.S. Patent No. 6,059,482 to Beauvoir and further in view of U.S. Patent No. 6,754,992 to Byfield et al.

(iv). Claim 15 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Japan No. 05-263469 to Furumi in view of U.S. Patent No. 6,059,482 to Beauvoir and U.S. Patent No. 4,905,436 to Matsuo et al. and further in view of U.S. Patent No. 6,754,992 to Byfield et al.

These rejections are respectfully traversed.

The Present Invention

An essential point of the present invention is to provide a column and beam join structure capable of minimizing damage to the structure by plasticizing the split tee in advance of the column and beam so as to absorb the energy of external force when an external force such as an earthquake or strong winds act on the structure. The purpose of the present invention is minimizing the external force acting on the column and beam.

In the column-beam join structure of the present invention, the flange of a split tee is connected to the column by bolts and web of the split tee is connected to the flange of the beam by bolts. In order to plasticize the split tee in advance of the column and beam, an open space is provided between the column and the flange of the split tee across the entire width *(i.e., dimension perpendicular to the axis of the steel column) of the flange by inserting space keeping members between the column and flange of the split tee or by partially reducing the thickness of the flange of the split tee across the entire width* (i.e., dimension perpendicular to the axis of the steel column) of the flange.

The portion of the flange of the split tee facing the open space plasticizes in advance of the column and beam and absorbs energy of an external force when the external force such as earthquake or strong winds acts on the structure.

Therefore, deformation of the column and beam of the structure can be minimized and the fundamental structure is kept safe.

Patentability

Japan No. 05-263469 ("JP '469")

JP '469 relates to a column-beam joint structure and discloses a structure where an end plate 10, which welded to an upper flange 3a and web 3c of a beam 3, is provided at the upper part of the beam made of a section steel. The end plate 10 is joined to a column with bolts. The lower flange 3c of the beam is joined to the column with bolts via a split tee.

Although Fig. 4 of JP '469 discloses an open space provided between the column and the flange of the split tee, referred to by the Office Action as across the entire width of the flange, this width is a dimension parallel to the axis of the steel column.

That is, the open space in JP '469 is provided in the direction perpendicular to the direction of the web (i.e., perpendicular to the extending direction of the web) of the split tee.

On the other hand, in the present invention, the open space is provided across the entire width* of the flange which is parallel to the extending direction of the web of the flange and is perpendicular to the axis of the column to which the split tee is connected.

Please see the attached reference figure of Attachment A hereto.

This difference affects the plasticization of the split tee and the absorption ability of the energy of an earthquake.

When an earthquake occurs, force acting on the beam is transferred from the web of the split tee to the column via the flange of the split tee.

In the present invention, since the direction of the open space formed between the flange of the split tee and the column is parallel to the web (i.e., parallel to the extending direction (plane) of the web) of the split tee on which the force acts, the flange corresponding to the portion where the open space is provided easily plasticizes and absorbs the energy of earthquake.

On the contrary, in JP '469, since the direction of the open space provided between the flange of the split tee and the column is perpendicular to the web (i.e., perpendicular to the extending direction (plane) of the web) of the split tee on which the force acts, when force of earthquake acts on the beam, the flange is tensioned as a whole and partial deformation of the flange corresponding to the portion where the open space is provided cannot be generated and plasticized. Therefore, the energy of the earthquake cannot be absorbed by plasticizing the flange of JP '469.

JP '469 does not disclose or suggest an open space provided between the column and the flange of the split tee across the entire width* (i.e., dimension perpendicular to the axis of the steel column) of the flange of the split tee.

Based on the annotations in the Office Action, the Office Action defines the "width" of flange of the split tee of JP '469 as a dimension parallel to the axis of the steel column to which the flange of the split tee of JP '469 is connected.

On the contrary, in the present invention, as shown in Figs. 12(a), 12(b) and 16, the width* of flange is defined as a dimension perpendicular to the axis of the column to which the flange of the split tee of the present invention is connected.

When the dimension of the flange parallel to the axis of the steel column to which the split tee is connected is defined as "width" of flange as in the Office Action, the dimension of the flange perpendicular to the axis of the steel column to which the split tee is connected may be defined as "length" of flange.

However, as stated in the claims of the present application, the flange has a width perpendicular to the axis of the steel column, and the flange of the split tee and steel column are connected in the state of maintaining an open across the entire width of the flange as defined in the claims of the present application.

It is submitted that the open space provided by the present invention is clearly different from JP '469.

Since JP '469 does not disclose or suggest the open space provided between the column and the flange of the split tee across the entire width* of the flange as defined in the present invention, the present invention is not disclosed or suggested by JP '469.

The secondary references do not cure the defect in the disclosure of JP '469.

U.S. Patent No. 6,059,482 ("US '482") to Beauvoir.

US '482 relates to a bolted connector (split tee) for connecting beams and columns. The connector has a web having a partially reduced portion (thickness) and a flange having a tapered portion.

US '482 does not disclose an open space between a flange of a split tee and the column across the entire width of the flange of the split tee, the width being perpendicular to the axis of the column.

Therefore, US '482 does not disclose or suggest the technical feature of the present invention that the flange of the split tee is plasticized prior to the beam and the column being plasticized.

Although the cross-sectional area of the flange of the connector of US '482 is partially reduced, the flange is merely tapered and does not have a cross-sectional shape of the present invention promoting plasticization such as the present invention.

According to the present invention, in order to plasticize the flange of the split tee prior to the column and/or the beam, the cross-sectional area of the flange of the split tee, i.e., the thickness of the flange, is partially reduced across the entire width of the flange at least at a region corresponding to the extended direction of the web of the split tee, wherein the width is perpendicular to the axis of the column.

Since the shape and the position where the partially reduced portion of the flange is provided in US '482 are different from those of the present invention, US '482 does not disclose or suggest the present invention.

U.S. Patent No. 4,905,436 to Matsuo ("US '436")

US '436 relates to a column and beam join structure and discloses a structure where the column 1 and the beam 2 are joined by a connector 3 using bolts.

As shown in Fig. 9 of US '436, reinforcing plates 9 are inserted between the flange of the connector and the flange of the column.

As described in column 4, line 46 to 50 of US '436, the reinforcing plates are welded to the surface of the flange of the column.

US '436 does not provide the open space between the flange of the column and the flange of the connector, which would serve as a deforming space for the flange of the split tee, as in the present invention, in the region corresponding to the extended direction of the web of the split tee of the present invention.

Therefore, these reinforcing plates of US '436 cannot have a function to plasticize the flange of the split tee prior to the column and the beam.

The reinforcing plates of US '436 are different from the space keeping members of the present invention and do not disclose or suggest the open space across the entire width of the flange of the split tee provided by the space keeping members of the present invention between the flange of the split tee and the column, wherein the width is perpendicular to the axis of the column.

U.S. Patent No. 6,754,992 ("US '992") to Byfield et al. relates to a connector connecting column (1) and beam (2) and discloses a connector (3) having flange (4) and web (5) and each having plurality of slots (6) formed by an acute head (7) and a coextensive neck (8).

Further, as shown in Figs. 2, 3 and 7 of US '992, for example, a plurality of studs (11) having head (12) and shank (14) are fixed on the web or flange of the column and on the web of the beam by welding or bolting.

The acute head (7) of the slot (6) of the connector (3) of US '992 is inserted into the head (12) of the stud (11) fixed on the web of the column (1) and beam (2), and then is moved so that the shank (14) of the stud (11) is positioned at the neck (8) of the slot (6), and as a result the web or flange of the connector is engaged with the shank of the stud fixed on the flange or web of the column and on the web of the beam.

That is, the column and beam of the structure of US '992 are connected by engaging the neck (8) of the connector (3) with the shank of the stud on the column and beam.

As explained above, in the present invention, the web of the split tee is connected to the flange of the beam by bolting, while in US '992, as shown in Figs. 1, 2, 8-10, 12-13, 25, 27 and 28, the web of the connector (split tee) is connected to the web of the beam by engaging with studs and not by bolting.

Therefore, the joining form of the present invention is completely different than US '992.

US '992 does not disclose or suggest the open space of the present invention, which is across the entire width of the flange of the split tee, to provide for the flange of the split tee to plasticize prior to the column and beam, wherein the width is perpendicular to the axis of the column.

US '992 does not disclose or suggest the present invention.

Summary

It is therefore submitted that claims 8-9 and 14-20 are patentable over JP '469 and/or US '436 and/or US '482 and/or US '992 alone or in combination.

CONCLUSION

It is submitted that in view of the forgoing remarks, the application is now in condition for allowance. It is therefore respectfully requested that the application be allowed and passed for issue.

Respectfully submitted,

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